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PERCEIVED RISK OF OCCUPATIONAL INJURY: THE IMPACT OF OCCUPATIONAL HAZARDOUSNESS, TYPE OF WORK, AND RECENT PERSONAL INJURY ACCIDENTS

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Perceived Risk of Occupational Injury: The Impact of Occupational Hazardousness, Type of Work, and Recent Personal Injury Accidents

ABSTRACT

Two-hundred and fifty-six employed men and women were extensively surveyed concerning workplace hazardousness and the risk of injury due to work-related accidents. A causal model was proposed and evaluated using multiple regression analysis. Risk of injury was strongly predicted by four variables: type of work engaged in by the respondent, the repetitiveness of the work, recent personal injury accidents, and perception of worksite hazards. Respondents engaged in occupations requiring manual activity perceived a greater risk of injury from accidents than respondents in non-manual activity occupations. Respondents suffering an accident in the last twelve months and those engaged in repetitive work perceived a greater risk of injury. Slower paced work indirectly affected the perception of risk by decreasing the likelihood of an accident. Older workers perceived fewer hazards and reported fewer accidents. Worker's sex was not statistically significant.

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INTRODUCTION

Workplace safety relies on the ability of workers to recognize hazards that may lead to personal injury and to take action removing or minimizing these dangers. Two studies by Blignault (1979a; 1979b) indicate that for mineworkers, actual work experience increases the detection of warnings of dangerous situations such as rockfalls. Training in recognizing potential hazards serves the same function as job experience; i.e., it enhances the ability to recognize hazards (Blignault, 1979b). Studies of a wide range of threats to human health (Lichtenstein et al., 1978; Preston et al., 1983) document a tendency for humans to underestimate the probability of occurrence and the harmfulness of natural disasters, diseases, or accidents that occur relatively infrequently and claim only one victim at a time. More publicized, large-scale disasters with multiple victims, on the other hand, are overestimated. Other research shows that potential victims of natural or environmental disasters must perceive that the problem is a sufficiently serious threat to their wellbeing (Preston et al., 1983) and that their actions can effectively resolve it (Arbuthnot, 1977) before they are willing to act against it, such as by moving to a safer location or taking political action.

The present study adds to this literature by examining other variables which may increase one's perception of occupational hazards as well as the sense of personal risk in the workplace.

One very obvious factor to consider is whether or not a individual has had a recent job-related accident resulting in personal injury. Such accidents should alert the worker to hazards in the workplace and make the risk of injury more salient. One recent study (Johnson & Tversky, 1983) argues that

descriptive accounts of tragic deaths, such as those provided by newspaper or television reports, highlight the emotional overtones of incidents of illness, natural disaster, or accident. As a result, the perceived frequency of these occurrences is overestimated. Similarly, for individuals performing a particular kind of work, having personally experienced a job-related accident may increase the perceived hazardousness of the occupation and the risk of injury.

A second factor examined in this study is the type of work that a person does. Individuals carrying out tasks requiring the operation of heavy equipment or machinery, construction work, or assembly line fabrication may be exposed, from both an objective and subjective perspective, to greater numbers of hazards and risk of injury. Persons engaged in occupations involving the management of people and ideas should have fewer and less serious risks.

Two dimensions of work are looked at -- the repetitiveness of work-related tasks and the pace of work. Working at a rapid pace may be perceived as riskier because of a failure to attend to warning signals or to take protective measures. Fast paced work may also increase the chance of error or fatigue in operating equipment. Repetitive work in which a person performs the same task repeatedly may increase a sense of safety because fewer errors resulting in injury are likely to occur with well-learned, familiar activities. On the other hand, repetitiveness may lead to boredom, lessening one's vigilance, and thereby increasing workplace hazards.

The effects of a worker's age and sex are also examined. Research (Manheimer et al., 1966; Schiff, 1977) finds that older persons are more likely to take active measures to avoid potentially injurious hazards, such as wearing seatbelts when they drive. Consequently, we expect to find that older workers will perceive their jobs as less hazardous and will have lower accident rates.

Male workers are expected to be exposed to more hazardous working conditions and to have higher accident rates than female workes. As a result, males will report a greater risk of personal injury.

METHOD

1. The Sample.

Data analyzed in this study are taken from a larger survey of the quality of working life conducted in Edmonton, Alberta in 1983. Questions were asked in this interview-based survey concerning a respondent's job history, work characteristics, workplace, and occupational safety.

A simple random sample of 547 addresses was drawn from a computerized list of addresses compiled by the City of Edmonton in its 1982 census enumeration. Nursing homes and temporary residences were deleted from the sample. Within each selected household, one eligible person (18 years or older) was selected as the respondent for the one hour interview.

Of the 547 addresses originally drawn, 420 completed interviews (76.8%) were achieved. Of these, 54.0% are male and 46.0% are female. A comparison of data from the survey with 1981 Canadian census statistics reveals a high degree of similarity in terms of household and age composition. This indicates that the sample is highly representative of the general adult population in Edmonton (Kinzel, 1983).

In the present study, data are analyzed for 256 respondents. These are respondents who: (1) gave complete answers to all of the items used in the study and, (2) were employed outside the home on a full-time or part-time basis. Of these 256 respondents, 59.0% are male and 41.0% are female. Forty-seven percent of the sample reports being exposed to workplace hazards. Six percent have had a job-related personal injury accident in the last twelve months. Twenty-eight

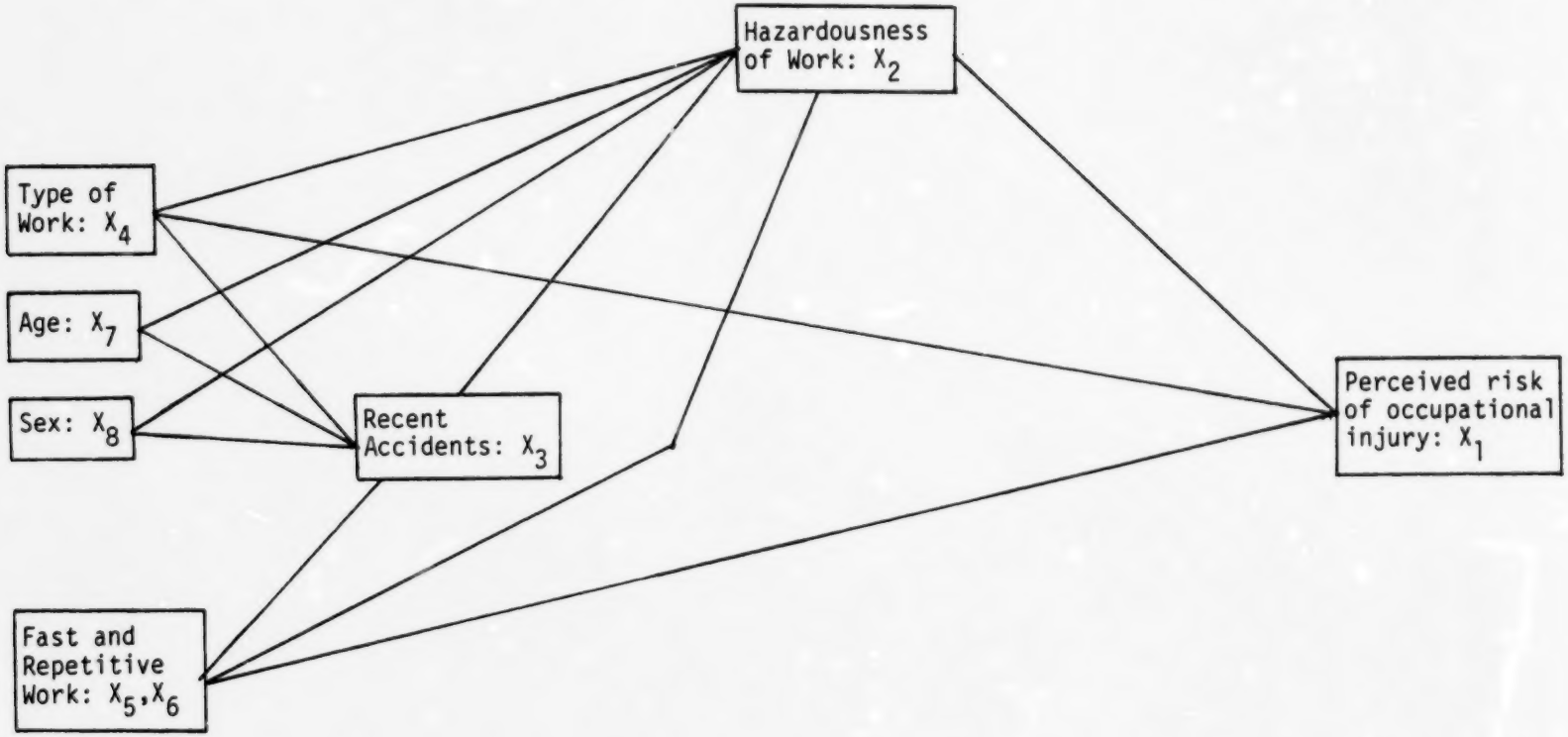
TABLE 1 -- Descpritive Statistics

Variable	Questionnaire Items	Response Categories	Mean	Standard Deviation
1. Risk of occupational injury: X_1	My chances of being hurt are pretty remote in the kind of work I do.	Strongly disagree (7)- Strongly agree (1)	2.81	2.07
2. Hazardousness: X_2	Does your job ever expose you to any dangerous or unhealthy conditions?	Yes (1) - No (0)	0.47	0.50
3. Recent accidents: X_3	During this past year, have you had any accident at work that have affected your health?	Yes (1) - No (0)	0.08	0.28
4. Type of Work: X_4	What kind of work do you do?	Type (1): agriculture, mining, oil-gas, processing, machining, fabrication-assembly, construction, transportation, equipment operation, materials handling, other equipment operation Type (0): management/ administration, science/ engineering, teaching, medicine-health, arts/ recreation, clerical, sales, service.	0.26	0.44

Table 1: Cont'd

Variable	Questionnaire Items	Response Categories	Mean	Standard Deviation
5. Repetitive Work: X_5	My job requires that I do the same thing over and over.	Strongly agree (7) - Strongly disagree (1)	4.99	1.86
6. Fast Work: X_6	My job requires that I very fast.	Strongly agree (7) - Strongly disagree (1)	4.64	1.69
7. Age: X_7	What is your age?	Number of years	38.01	15.11
8. Sex: X_8	Sex of respondent.	Male (1) - Female (2)	1.46	0.50

FIGURE 1. Hypothesized Path Model



percent of the respondents are engaged in manual-activity occupations and 72.0% in non-manual activity work.

2. The Variables.

Table 1 provides a detailed description of variables analyzed in this study. The major dependent variable is a respondent's perceived chance of being hurt at work. Figure 1 describes the path model tested in this study. Five predictors are expected to directly affect the dependent variable: (1) Type of work engaged in by the respondent; (2) whether or not the respondent has had a personal injury accident in the last twelve months; (3) the hazardousness of the respondent's occupation; (4) the repetitiveness of respondent's work, and (5) how quickly a respondent must conduct his work activities. Two additional variables -- sex and age -- are hypothesized to have on indirect effects on perceived risk of injury. These effects are mediated by recent acccidents and hazardousness of work.

3. Method of Analysis.

Regression analysis will be used to estimate the paths hypothesized in Figure 1. In order to achieve the most elegant model, the model will be trimmed to include only those beta weights which are at least $\pm$ 0.10 in value and statistically significant at the 0.05 level or better.

RESULTS

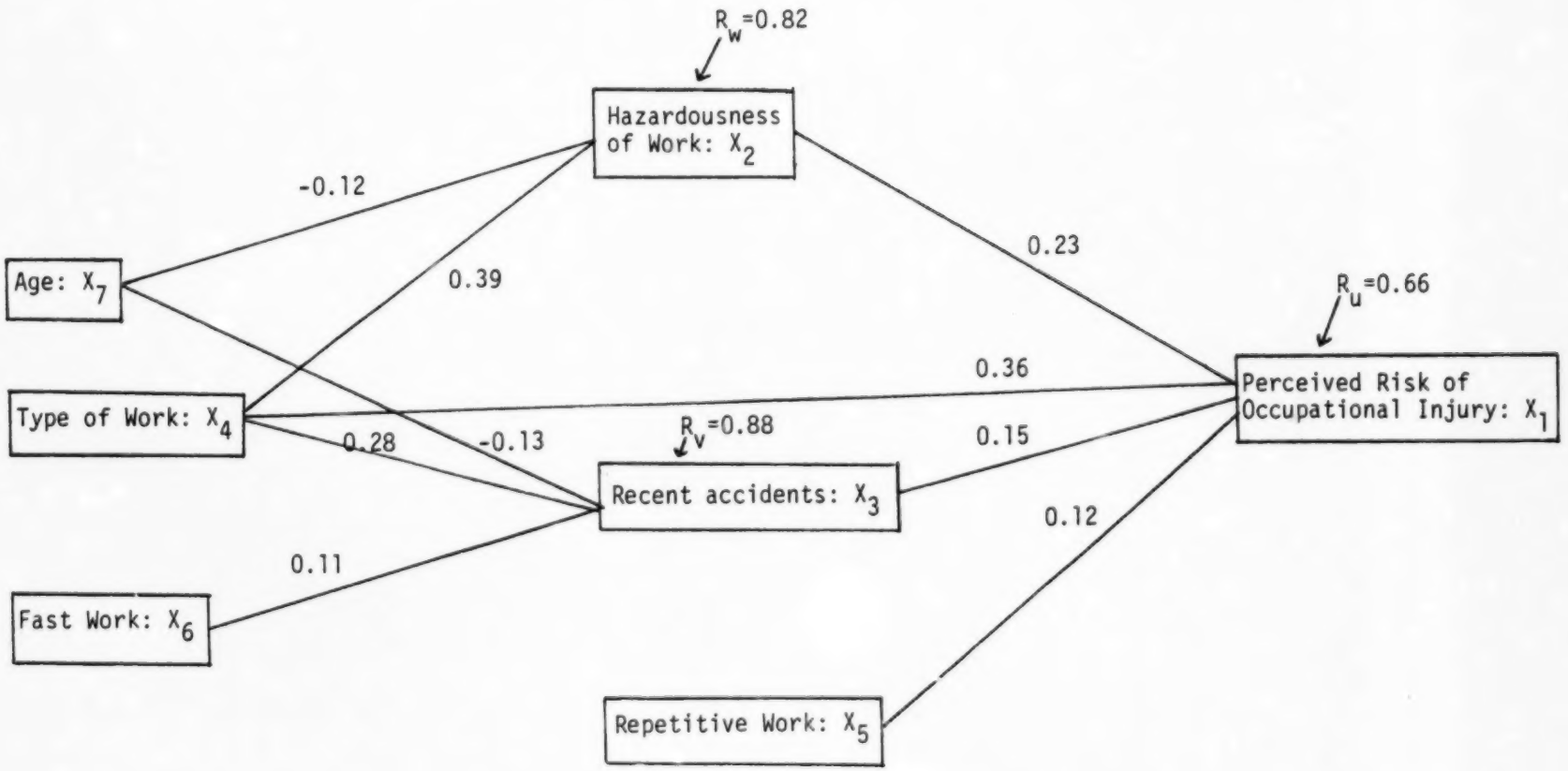
1. Correlational Analysis.

Perceptions of a worker's risk of occupational injury is significantly correlated with all of the predictors except speed of work. The more hazardous one perceives his workplace to be, the greater the perceived risk of injury. Having experienced a personal injury while at work also increases the perception of risk. Work involving manual activity and repetitive work increase the risk

TABLE 2 -- Intercorrelation Matrix

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
Risk of Injury: X_1	----	0.41***	0.30***	0.50***	0.12***	-0.02	-0.17**	-0.19**
Hazardousness: X_2	----	----	0.19**	0.41***	0.05	0.03	-0.18**	-0.12*
Recent accidents: X_3	----	----	----	0.29***	-0.03	0.12*	-0.18**	-0.09
Type of Work: X_4	----	----	----	----	-0.01	-0.05	-0.10*	-0.47***
Repetitive Work: X_5	----	----	----	----	----	0.09	0.08	0.24***
Fast Work: X_6	----	----	----	----	----	----	-0.09	0.13*
Age: X_7	----	----	----	----	----	----	----	0.12**
Sex: X_8	----	----	----	----	----	----	----	----

FIGURE 2. Trimmed Path Model



of injury. Older employees perceive fewer risks. Female workers also regard their chances of injury to be lower than do male workers.

2. Path Analysis.

Four of the predictors of the risk of injury have statistically significant direct effects. Altogether, these four variables account for 34.0% of the variance in perceived risk. Strongest of the four is type of work, with manual activity-oriented work eliciting a greater perceived risk of injury. Type of work also has indirect effects mediated by hazardousness of work ($p_{12}p_{24} = 0.09$) and recent accidents ($p_{13}p_{34} = 0.04$). That is, type of work significantly affects perceptions of the hazardousness of work as well as the likelihood of a recent personal injury accident. Manual activity occupations are seen as more hazardous and are more likely to incur a personal injury accident. Accidents and hazardousness, in turn, significantly increase the perceived risk of injury.

Repetitive work also tends to increase the risk of injury. Fast work, while not having a significant direct effect, has a indirect impact of 0.02 ($p_{13}p_{36}$) which is mediated by recent accidents. Respondents reporting that they must work quickly are more likely to have experienced a recent personal injury accident. To the extent these respondents have been injured in an accident, they tend to feel a greater risk of future injury.

Similarly, age does not directly influence risk of injury, but indirectly affects this variable through its effects on hazardousness and recent accidents ($p_{12}p_{27} + p_{13}p_{37} = -0.05$). Older respondents report that their work is less hazardous and that they have not had a recent accident. Sex of the worker has no significant effect in this model.

DISCUSSION

Perceived risk of occupational injury is strongly related to a number of occupationally-related factors. Individuals who work with heavy equipment, tools, machinery, or fabricating equipment perceive a greater risk of injury than individuals working as salesmen, administrators, teachers, or professionals. In addition, individuals in jobs requiring a considerable amount of manual activity are more inclined to view their work as exposing them to a variety of hazards. Clearly, the activities associated with these occupations expose the worker to a greater number of highly visible hazards that can cause falls, cuts, burns, and equipment-related injuries. At the same time, workers in these fields are also more likely to have co-workers who have become victims even if they have not themselves been involved in an accident. This should increase the salience of hazards. The potential hazards to persons in non-manual activity occupations may, in fact, be far fewer. Where they exist, they may be less visible or more long-term in their consequences, e.g., radiation from video display terminals, or asbestos dust inhalation for occupants of office buildings.

One specific dimension of work-related activity -- the repetitiveness of work -- had a significant impact on risk of injury. Those respondents viewing their jobs as repetitive were more likely to perceive a high risk of injury. Possibly this is because these jobs are so tedious that normal safety precautions are disregarded due to boredom or fatigue. An alternative explanation, that repetitive jobs are more likely to expose the worker to a greater incidence of hazards, is less tenable. There was only a negligible correlation between repetitive work and an identification of this work as hazardous ($r = 0.05$).

A second dimension of work-related activity -- the pace of work -- did not directly affect risk of injury. It did, however, predict whether or not a worker had suffered an accident-related injury in the past. Those working at high paced jobs were more likely to report being accident victims. In turn, this recent accident history increased one's belief that there was a high degree of risk of future injury.

Age indirectly affected perceived risk through its impact on perceptions of hazards and recent accidents. Older workers tended to view their work as having a lower risk of injury because it was less hazardous and because they had fewer accidents. Part of the explanation for this may be that their work is less manual and more administrative in nature ($r = -0.10$, p less than 0.05). Thus, older workers would be less exposed to those hazards that normally create a sense of personal risk. However, the regression analysis found that age had a significant impact on perceptions of hazards and personal injury accidents even when type of work was controlled for. Further research is needed to establish whether older workers take conscious actions to reduce their exposure to hazards, for example, by wearing protective clothing, removing hazards from a worksite, and so on. Older workers may also view themselves as more skilled and experienced so that they are less vulnerable to the dangers present at work.

REFERENCES

Arbuthnot, J. (1977). The roles of attitudinal and personality variables in the prediction of environmental behavior and knowledge. Environment and Behavior, 9, 217-232.

Blignault, C.J.H. (1979a). The perception of hazard: 1. Hazard Analysis and the contribution of visual search to hazard perception. Ergonomics, 22, 991-999.

Blignault, C.J.H. (1979b). Hazard Perception: 2. The contribution of signal detection to hazard perception. Ergonomics, 22, 1177-1183.

Johnson, E.J., Tuersky, A. (1983). Affect, generalization, and the perception of risk. Journal of Personality and Social Psychology, 45, 20-31.

Kinzel, C. (1983). 1983 Edmonton Area Study Sampling Report. Population Research Laboratory EAS series, Report No. 29, University of Alberta.

Lichtenstein, S., Slovic, P., Fischoff, B., Layman, M., Combs, B. (1978). Judged frequency of lethal events. Journal of Experimental Psychology: Human Learning and Memory, 4, 551-578.

Manheimer, D.I., Mellinger, G.D., Crossley, H.M. (1936). A follow-up Study of Seatbelt usage. Traffic Safety Research Review, 10, 2-13.

Preston, V., Taylor, S.M., Hodge, D.C. (1983). Adjustment to natural and technological hazards. Environment and Behavior, 15, 143-164.

Schiff, M. (1977). Hazard adjustment, locus of control, and sensation-seeking: Some null findings. Environment and Behavior, 9, 233-243.

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